

WHAT IS CLAIMED IS:

- 1 1. A method of operating a data transmission system comprising:
2 segmenting a frame of user data for transport by plural AAL2 packets, AAL2
3 packets being packets of ATM Adaptation Layer 2, ATM being Asynchronous Transfer
4 Mode, each of the plural AAL2 packets having a header which includes a length
5 indicator field;
6 using one or more Internet Protocol packets to transport the plural AAL2
7 packets;
8 using a predetermined value in the length indicator (LI) field in a header of one
9 of the plural AAL2 packets to indicate the frame is transported by plural AAL2 packets.
- 1 2. The method of claim 1, wherein the predetermined value is one of a range of
2 reserved values for the length indicator field, each value of the range corresponding to a
3 sequence number rather than to a length indication.
- 1 3. The method of claim 2, wherein the range comprises numbers which are
2 greater than a maximum number of octets in a standard size AAL2 packet.
- 1 4. The method of claim 3, wherein a last AAL2 packet of the plural AAL2
2 packets is detected by having in its length indicator field a value not greater than the
3 maximum number of octets in a standard size AAL2 packet.
- 1 5. The method of claim 2, wherein the range includes at least one value
2 between 48 to 63 inclusive.
- 1 6. The method of claim 2, wherein the range extends from 48 to 63 inclusive.
- 1 7. The method of claim 2, wherein a modulo division of the predetermined
2 value provides the sequence number.
- 1 8. The method of claim 2, wherein a last AAL2 packet of the plural AAL2
2 packets has in its length indicator field an actual length value of the last AAL2 packet,
3 and wherein contents of a user-to-user indication (UUI) field in the header of the last
4 AAL2 packet can be used to confirm that the last AAL2 packet is in a proper sequence.

1 9. The method of claim 8, wherein the user-to-user indication (UUI) field in the
2 header of the last AAL2 packet has a value Q-E, where Q is the number that would
3 have been used in the length indicator field had the last cell not been the last cell, and
4 wherein E is an endpoint of the range.

1 10. The method of claim 1, wherein the predetermined value belongs to one of
2 two ranges of reserved values for the length indicator field, each value of the two
3 ranges corresponding to a sequence number rather than to a length indication.

1 11. The method of claim 10, wherein the predetermined value is a value greater
2 than a maximum number of octets in a standard size AAL2 packet.

1 12. The method of claim 10, wherein when the predetermined value belongs to
2 a first of the two ranges, the predetermined value corresponds to a sequence number for
3 a first of the plural AAL2 packets; and wherein when the predetermined value belongs
4 to a second of the two ranges, the predetermined value corresponds to a sequence
5 number for other than a first of the plural AAL2 packets.

1 13. The method of claim 12, wherein the first of the two ranges extends from
2 48 to 55 inclusive, and a second of the two ranges extends from 56 to 63 inclusive.

1 14. The method of claim 12, wherein a modulo division of the predetermined
2 value provides the sequence number.

1 15. The method of claim 10, wherein a last AAL2 packet of the plural AAL2
2 packets has a predetermined end-of-user data packet value in its user-to-user indication
3 (UUI) field of its header.

1 16. The method of claim 1, wherein the predetermined value serves as a
2 notification that another AAL2 packet of the plural AAL2 packets carries subsequent
3 data belonging to the frame.

1 17. The method of claim 16, wherein the predetermined value is a value greater
2 than a maximum number of octets in a standard size AAL2 packet.

1 18. The method of claim 17, wherein the predetermined value is 46.

1 19. The method of claim 17, wherein a last AAL2 packet of the plural AAL2
2 packets is detected by having in its length indicator field a value not greater than the
3 maximum number of octets in a standard size AAL2 packet.

1 20. The method of claim 17, wherein a user-to-user indication (UUI) field in
2 the header of the one of the plural AAL2 packets as sequence number.

1 21. The method of claim 16, wherein the predetermined value is a value greater
2 than a maximum number of octets in a standard size AAL2 packet.

1 22. The method of claim 21, wherein the predetermined value is 46.

1 23. A method of operating a data transmission system comprising:
2 segmenting a frame of user data for transport by plural AAL2 packets, the AAL2
3 packets being packets of ATM Adaptation Layer 2, ATM being Asynchronous Transfer
4 Mode, each of the plural AAL2 packets having a header which includes a length
5 indicator field;

6 using one or more Internet Protocol packets to transport the plural AAL2
7 packets;

8 inserting a sequence number-related value in the length indicator (LI) field of a
9 header of all but a last of the plural AAL2 packets.

1 24. The method of claim 23, wherein the sequence number-related value
2 inserted in all but the last of the plural AAL2 packets is greater than a maximum
3 number of octets in a standard size AAL2 packet.

1 25. The method of claim 23, wherein the sequence number-related value
2 inserted in all but the last of the plural AAL2 packets is in a range of from 48 to 63
3 inclusive.

1 26. The method of claim 23, further comprising:

2 inserting an actual length value in the length indicator (LI) field of the last of the
3 plural AAL2 packets; and

4 inserting in a user-to-user indication (UUID) field in the header of the last AAL2
5 packet a value which can be used to confirm that the last AAL2 packet is in a proper
6 sequence.

1 27. The method of claim 26, wherein the user-to-user indication (UUID) field in
2 the header of the last AAL2 packet has a value Q-E, where Q is the number that would
3 have been used in the length indicator field had the last cell not been the last cell, and
4 wherein E is an endpoint of the range.

1 28. The method of claim 23, wherein the sequence number-related value
2 inserted in all but the last of the plural AAL2 packets is selected from one of two ranges
3 of reserved values for the length indicator field.

1 29. The method of claim 28, wherein for a first of the plural AAL2 packets the
2 sequence number-related value in the length indicator (LI) field belongs to a first of the
3 two ranges, and wherein for all but the first and the last of the plural AAL2 packets the
4 sequence number-related value in the length indicator (LI) field belongs to a second of
5 the two ranges.

1 30. The method of claim 29, wherein the first of the two ranges extends from
2 48 to 55 inclusive, and a second of the two ranges extends from 56 to 63 inclusive.

1 31. A method of operating a data transmission system comprising:
2 segmenting a frame of user data for transport by plural AAL2 packets, the AAL2
3 packets being packets of ATM Adaptation Layer 2, ATM being Asynchronous Transfer
4 Mode, each of the plural AAL2 packets having a header which includes a length
5 indicator field;

6 using one or more Internet Protocol packets to transport the plural AAL2
7 packets;

8 inserting a predetermined number in the length indicator (LI) field of a header of
9 all but a last of the plural AAL2 packets, the predetermined value serving as a
10 notification that another AAL2 packet of the plural AAL2 packets carries subsequent
11 data belonging to the frame.

1 32. The method of claim 31, wherein the predetermined value is a value greater
2 than a maximum number of octets in a standard size AAL2 packet.

1 33. The method of claim 32, wherein the predetermined value is 46.

1 34. The method of claim 31, wherein a last AAL2 packet of the plural AAL2
2 packets is detected by having in its length indicator field a value not greater than the
3 maximum number of octets in a standard size AAL2 packet.

1 35. The method of claim 31, wherein a user-to-user indication (UUID) field in
2 the header of the one of the plural AAL2 packets as sequence number.

1 36. A unit of a data transmission system which segments a frame of user data
2 for transport by plural AAL2 packets, AAL2 packets being packets of ATM Adaptation
3 Layer 2, ATM being Asynchronous Transfer Mode, each of the plural AAL2 packets
4 having a header which includes a length indicator field, one or more Internet Protocol
5 packets being used to transport the plural AAL2 packets, wherein the unit inserts a
6 predetermined value in the length indicator (LI) field in a header of one of the plural
7 AAL2 packets to indicate the frame is transported by plural AAL2 packets.

1 37. The apparatus of claim 36, wherein the predetermined value is one of a
2 range of reserved values for the length indicator field, each value of the range
3 corresponding to a sequence number rather than to a length indication.

1 38. The apparatus of claim 37, wherein the range comprises numbers which are
2 greater than a maximum number of octets in a standard size AAL2 packet.

1 39. The apparatus of claim 37, wherein the range includes at least one value
2 between 48 to 63 inclusive.

1 40. The apparatus of claim 37, wherein the range extends from 48 to 63
2 inclusive.

1 41. The apparatus of claim 37, wherein a modulo division of the predetermined
2 value provides the sequence number.

1 42. The apparatus of claim 37, wherein the unit inserts in the length indicator
2 field of a last AAL2 packet of the plural AAL2 packets an actual length value of the
3 last AAL2 packet, and wherein the unit inserts in a user-to-user indication (UUI) field
4 in the header of the last AAL2 packet a value that can be used to confirm that the last
5 AAL2 packet is in a proper sequence.

1 43. The apparatus of claim 42, wherein the user-to-user indication (UUI) field
2 in the header of the last AAL2 packet has a value Q-E, where Q is the number that
3 would have been used in the length indicator field had the last cell not been the last cell,
4 and wherein E is an endpoint of the range.

1 44. The apparatus of claim 36, wherein the predetermined value belongs to one
2 of two ranges of reserved values for the length indicator field, each value of the two
3 ranges corresponding to a sequence number-related value rather than to a length
4 indication.

1 45. The apparatus of claim 44, wherein the predetermined value is a value
2 greater than a maximum number of octets in a standard size AAL2 packet.

1 46. The apparatus of claim 44, wherein when the predetermined value belongs
2 to a first of the two ranges, the predetermined value corresponds to a sequence number
3 for a first of the plural AAL2 packets; and wherein when the predetermined value
4 belongs to a second of the two ranges, the predetermined value corresponds to a
5 sequence number for other than a first of the plural AAL2 packets.

1 47. The apparatus of claim 44, wherein the first of the two ranges extends from
2 48 to 55 inclusive, and a second of the two ranges extends from 56 to 63 inclusive.

1 48. The apparatus of claim 44, wherein a last AAL2 packet of the plural AAL2
2 packets has a predetermined end-of-user data packet value in its user-to-user indication
3 (UUI) field of its header.

1 49. The apparatus of claim 36, wherein the predetermined value serves as a
2 notification that another AAL2 packet of the plural AAL2 packets carries subsequent
3 data belonging to the frame.

1 50. The apparatus of claim 49, wherein the predetermined value is a value
2 greater than a maximum number of octets in a standard size AAL2 packet.

1 51. The apparatus of claim 49, wherein the predetermined value is 46.

1 52. The apparatus of claim 49, wherein the unit inserts a sequence number in a
2 user-to-user indication (UUI) field in the header of the one of the plural AAL2 packets.

1 53. A unit of a data transmission system which segments a frame of user data
2 for transport by plural AAL2 packets, the AAL2 packets being packets of ATM
3 Adaptation Layer 2, ATM being Asynchronous Transfer Mode, each of the plural
4 AAL2 packets having a header which includes a length indicator field, one or more
5 Internet Protocol packets being used to transport the plural AAL2 packets, and wherein
6 the unit inserts a sequence number-related value in the length indicator (LI) field of a
7 header of all but a last of the plural AAL2 packets.

1 54. The apparatus of claim 53, wherein the sequence number-related value
2 inserted in all but the last of the plural AAL2 packets is greater than a maximum
3 number of octets in a standard size AAL2 packet.

1 55. The apparatus of claim 53, wherein the unit inserts the sequence number-
2 related value in a range of from 48 to 63 inclusive.

1 56. The apparatus of claim 53, wherein the unit inserts an actual length value in
2 the length indicator (LI) field of the last of the plural AAL2 packets; and wherein the
3 unit inserts in a user-to-user indication (UUI) field in the header of the last AAL2
4 packet a value which can be used to confirm that the last AAL2 packet is in a proper
5 sequence.

1 57. The apparatus of claim 56, wherein the user-to-user indication (UUI) field
2 in the header of the last AAL2 packet has a value Q-E, where Q is the number that
3 would have been used in the length indicator field had the last cell not been the last cell,
4 and wherein E is an endpoint of the range.

1 58. The apparatus of claim 53, wherein the sequence number-related value
2 inserted in all but the last of the plural AAL2 packets is selected from one of two ranges
3 of reserved values for the length indicator field.

1 59. The apparatus of claim 58, wherein for a first of the plural AAL2 packets
2 the sequence number-related value in the length indicator (LI) field belongs to a first of
3 the two ranges, and wherein for all but the first and the last of the plural AAL2 packets
4 the sequence number-related value in the length indicator (LI) field belongs to a second
5 of the two ranges.

1 60. The apparatus of claim 59, wherein the first of the two ranges extends from
2 48 to 55 inclusive, and a second of the two ranges extends from 56 to 63 inclusive.

1 61. A unit of a data transmission system which segments a frame of user data
2 for transport by plural AAL2 packets, the AAL2 packets being packets of ATM
3 Adaptation Layer 2, ATM being Asynchronous Transfer Mode, each of the plural
4 AAL2 packets having a header which includes a length indicator field, one or more
5 Internet Protocol packets being used to transport the plural AAL2 packets; wherein the
6 unit inserts a predetermined number in the length indicator (LI) field of a header of all
7 but a last of the plural AAL2 packets, the predetermined value serving as a notification
8 that another AAL2 packet of the plural AAL2 packets carries subsequent data
9 belonging to the frame.

1 62. The apparatus of claim 61, wherein the predetermined value is a value
2 greater than a maximum number of octets in a standard size AAL2 packet.

1 63. The apparatus of claim 62, wherein the predetermined value is 46.

1 64. The apparatus of claim 61, wherein a user-to-user indication (UUI) field in
2 the header of the one of the plural AAL2 packets as sequence number.

1 65. A unit of a data transmission system which reassembles a frame of user data
2 which has been segmented into plural AAL2 packets for transport, AAL2 packets being
3 packets of ATM Adaptation Layer 2, ATM being Asynchronous Transfer Mode, each
4 of the plural AAL2 packets having a header which includes a length indicator field, one

5 or more Internet Protocol packets having being used to transport the plural AAL2
6 packets, wherein the unit uses a predetermined value in the length indicator (LI) field in
7 a header of one of the plural AAL2 packets to detect that the frame is transported by
8 plural AAL2 packets.

1 66. The apparatus of claim 65, wherein the predetermined value is one of a
2 range of reserved values for the length indicator field, each value of the range
3 corresponding to a sequence number rather than to a length indication.

1 67. The apparatus of claim 66, wherein the range comprises numbers which are
2 greater than a maximum number of octets in a standard size AAL2 packet.

1 68. The apparatus of claim 66, wherein the range includes at least one value
2 between 48 to 63 inclusive.

1 69. The apparatus of claim 66, wherein the range extends from 48 to 63
2 inclusive.

1 70. The apparatus of claim 66, wherein a modulo division of the predetermined
2 value provides the sequence number.

1 71. The apparatus of claim 66, wherein the unit detects in the length indicator
2 field of a last AAL2 packet of the plural AAL2 packets an actual length value of the
3 last AAL2 packet, and wherein the unit detects in a user-to-user indication (UUI) field
4 in the header of the last AAL2 packet a value that can be used to confirm that the last
5 AAL2 packet is in a proper sequence.

1 72. The apparatus of claim 71, wherein the user-to-user indication (UUI) field
2 in the header of the last AAL2 packet has a value Q-E, where Q is the number that
3 would have been used in the length indicator field had the last cell not been the last cell,
4 and wherein E is an endpoint of the range.

1 73. The apparatus of claim 65, wherein the predetermined value belongs to one
2 of two ranges of reserved values for the length indicator field, each value of the two
3 ranges corresponding to a sequence number rather than to a length indication.

1 74. The apparatus of claim 73, wherein the predetermined value is a value
2 greater than a maximum number of octets in a standard size AAL2 packet.

1 75. The apparatus of claim 73, wherein when the predetermined value belongs
2 to a first of the two ranges, the predetermined value corresponds to a sequence number
3 for a first of the plural AAL2 packets; and wherein when the predetermined value
4 belongs to a second of the two ranges, the predetermined value corresponds to a
5 sequence number for other than a first of the plural AAL2 packets.

1 76. The apparatus of claim 73, wherein the first of the two ranges extends from
2 48 to 55 inclusive, and a second of the two ranges extends from 56 to 63 inclusive.

1 77. The apparatus of claim 73, wherein a last AAL2 packet of the plural AAL2
2 packets has a predetermined end-of-user data packet value in its user-to-user indication
3 (UUI) field of its header.

1 78. The apparatus of claim 65, wherein the predetermined value serves as a
2 notification that another AAL2 packet of the plural AAL2 packets carries subsequent
3 data belonging to the frame.

1 79. The apparatus of claim 78, wherein the predetermined value is a value
2 greater than a maximum number of octets in a standard size AAL2 packet.

1 80. The apparatus of claim 79, wherein the predetermined value is 46.

1 81. The apparatus of claim 79, wherein the unit detects a sequence number in a
2 user-to-user indication (UUI) field in the header of the one of the plural AAL2 packets.

1 82. A unit of a data transmission system which reassembles a frame of user
2 data which has been segmented into plural AAL2 packets for transport, AAL2 packets
3 being packets of ATM Adaptation Layer 2, ATM being Asynchronous Transfer Mode,
4 each of the plural AAL2 packets having a header which includes a length indicator
5 field, one or more Internet Protocol packets having been used to transport the plural
6 AAL2 packets, wherein the unit detects a sequence number-related value in the length
7 indicator (LI) field of a header of all but a last of the plural AAL2 packets.

1 83. The apparatus of claim 82, wherein the sequence number-related value
2 detected in all but the last of the plural AAL2 packets is greater than a maximum
3 number of octets in a standard size AAL2 packet.

1 84. The apparatus of claim 82, wherein the unit detects the sequence number-
2 related value in a range of from 48 to 63 inclusive.

1 85. The apparatus of claim 82, wherein the unit detects an actual length value in
2 the length indicator (LI) field of the last of the plural AAL2 packets; and wherein the
3 unit detects in a user-to-user indication (UUI) field in the header of the last AAL2
4 packet a value which can be used to confirm that the last AAL2 packet is in a proper
5 sequence.

1 86. The apparatus of claim 85, wherein the user-to-user indication (UUI) field
2 in the header of the last AAL2 packet has a value Q-E, where Q is the number that
3 would have been used in the length indicator field had the last cell not been the last cell,
4 and wherein E is an endpoint of the range.

1 87. The apparatus of claim 82, wherein the sequence number-related value
2 detected in all but the last of the plural AAL2 packets is in one of two ranges of
3 reserved values for the length indicator field.

1 88. The apparatus of claim 87, wherein for a first of the plural AAL2 packets
2 the sequence number-related value in the length indicator (LI) field belongs to a first of
3 the two ranges, and wherein for all but the first and the last of the plural AAL2 packets
4 the sequence number-related value in the length indicator (LI) field belongs to a second
5 of the two ranges.

1 89. The apparatus of claim 88, wherein the first of the two ranges extends from
2 48 to 55 inclusive, and a second of the two ranges extends from 56 to 63 inclusive.

1 90. A unit of a data transmission system which reassembles a frame of user
2 data which has been segmented into plural AAL2 packets for transport, AAL2 packets
3 being packets of ATM Adaptation Layer 2, ATM being Asynchronous Transfer Mode,
4 each of the plural AAL2 packets having a header which includes a length indicator

5 field, one or more Internet Protocol packets having being used to transport the plural
6 AAL2 packets, wherein the unit detects a predetermined number in the length indicator
7 (LI) field of a header of all but a last of the plural AAL2 packets, the predetermined
8 value serving as a notification that another AAL2 packet of the plural AAL2 packets
9 carries subsequent data belonging to the frame.

1 91. The apparatus of claim 90, wherein the predetermined value is a value
2 greater than a maximum number of octets in a standard size AAL2 packet.

1 92. The apparatus of claim 91, wherein the predetermined value is 46.

1 93. The apparatus of claim 90, wherein a user-to-user indication (UUI) field in
2 the header of the one of the plural AAL2 packets as sequence number.

1 94. A data communications network having a first node and a second node,
2 each of the first node and the second node having both a segmentation unit which
3 segments a frame of user data for transport by plural AAL2 packets and a reassembly
4 unit which reassembles a frame of user data which has been segmented into plural
5 AAL2 packets for transport, the AAL2 packets being packets of ATM Adaptation
6 Layer 2, ATM being Asynchronous Transfer Mode, each of the plural AAL2 packets
7 having a header which includes a length indicator field, one or more Internet Protocol
8 packets being used to transport the plural AAL2 packets between the first node and the
9 second node; wherein:

10 the segmentation unit inserts a predetermined value in the length indicator (LI)
11 field in a header of one of the plural AAL2 packets to indicate the frame is transported
12 by plural AAL2 packets; and

13 the reassembly unit detects the predetermined value in the length indicator (LI)
14 and handles the one of the plural AAL2 packets as having segmented user data.

1 95. The apparatus of claim 94, wherein the segmentation unit inserts a sequence
2 number-related value in the length indicator (LI) field of a header of all but a last of the
3 plural AAL2 packets.

1 96. The apparatus of claim 95, wherein the sequence number-related value
2 inserted in all but the last of the plural AAL2 packets is greater than a maximum
3 number of octets in a standard size AAL2 packet.

1 97. The apparatus of claim 95, wherein the segmentation unit inserts an actual
2 length value in the length indicator (LI) field of the last of the plural AAL2 packets; and
3 wherein the unit inserts in a user-to-user indication (UUI) field in the header of the last
4 AAL2 packet a value which can be used to confirm that the last AAL2 packet is in a
5 proper sequence.

1 98. The apparatus of claim 96, wherein the user-to-user indication (UUI) field
2 in the header of the last AAL2 packet has a value Q-E, where Q is the number that
3 would have been used in the length indicator field had the last cell not been the last cell,
4 and wherein E is an endpoint of the range.

1 99. The apparatus of claim 94, wherein the sequence number-related value
2 inserted in all but the last of the plural AAL2 packets is selected from one of two ranges
3 of reserved values for the length indicator field.

1 100. The apparatus of claim 99, wherein for a first of the plural AAL2 packets
2 the sequence number-related value in the length indicator (LI) field belongs to a first of
3 the two ranges, and wherein for all but the first and the last of the plural AAL2 packets
4 the sequence number-related value in the length indicator (LI) field belongs to a second
5 of the two ranges.

1 101. The apparatus of claim 99, wherein the first of the two ranges extends
2 from 48 to 55 inclusive, and a second of the two ranges extends from 56 to 63
3 inclusive.

1 102. The apparatus of claim 94, wherein the segmentation unit inserts a
2 predetermined number in the length indicator (LI) field of a header of all but a last of
3 the plural AAL2 packets, the predetermined value serving as a notification that another
4 AAL2 packet of the plural AAL2 packets carries subsequent data belonging to the
5 frame.

1 103. The apparatus of claim 102, wherein the predetermined value is a value
2 greater than a maximum number of octets in a standard size AAL2 packet.

1 104. The apparatus of claim 103, wherein the predetermined value is 46.

1 105. The apparatus of claim 102, wherein a user-to-user indication (UUI) field
2 in the header of the one of the plural AAL2 packets as sequence number.

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